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PAPR Breathing Performance

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PAPR Breathing Performance

PAPR type

- **PAPR concept allows for different operational technologies:**
 - **Constant flow PAPR**
 - Moderate breathing performance
 - High breathing performance
 - **Demand response PAPR**
 - Moderate breathing performance
 - High breathing performance

PAPR Breathing Performance

**Manufacturer will specify
at time of application**

- **The operational battery life of PAPR
(minimum life will be 4 hours?)**
- **The flow rate or pressure that activates
the low flow and pressure indicator**

PAPR Breathing Performance

Moderate Breathing Rate

- PAPR will be evaluated using the breathing machine specified in 42 CFR, Part 84, Subpart H, Paragraph 84.88
- Breathing machine operating at 24 respirations per minute and a minute volume of 40 Lpm, peak rate is 115 Lpm

PAPR Breathing Performance

High Breathing Rate

- PAPR will be evaluated using the breathing machine specified in *NFPA 1981, Open–Circuit Self Contained Breathing Apparatus for Fire and Emergency Service, 2002 Edition*
- Breathing machine operated at 30 respirations per minute delivering a minute volume of 103 Lpm, peak rate is 300 Lpm

PAPR Breathing Performance

Requirement

- During operation of PAPR, while on a manikin, the pressure inside the facepiece shall be maintained at greater than 0.0 and less than or equal to ≤ 3.5 inches of water column pressure
- Breathing performance will be evaluated for operational battery life, plus 20 minutes

PAPR Breathing Performance

**Additional performance considerations
not listed in concept paper -- Load test**

- **A breathing performance will be evaluated for the operational battery life, plus 20 minutes, with a load placed on the filter**
- **Load can be performed by using the silica dust chamber**
- **Either a set load value or create a gradual load over time on the canister**
- **The amount of load and the loading rate is still being investigated**
- **Minimum Operational Battery Life of 4 hours ?**

PAPR Breathing Performance

What equipment is needed for testing

- Breathing machines for Moderate and High performance
- Pressure transducers and data collection

PAPR Breathing Performance

Further study is needed for developing a load test for the canister.

- Instantaneous load vs. a gradual loading
 - Total load on the filter
 - Rate of loading

PAPR Breathing Performance

Questions and Comments

Q: Is silica dust the best chemical to use to represent dust? It is toxic and there is other non-toxic chemical to use. What does silica dust represent in real life values?

A: Silica dust is what is listed in 42 CFR, because of that I am not sure if it can be changed to another chemical. I do not know what in actuality this represents. We also looking for at ways to represent a loading mechanically with out the use of chemicals.

Q: Could the Posichek3 be used for both the 40 Lpm and the 103 Lpm.

A: The Posichek3 does fit the requirement for the NFPA machine for 103 Lpm. The Posichek3 could also be used for the 40 Lpm. We are going to evaluate both 40 Lpm and 103 Lpm machines and the Posichek3 to determine which is better.

PAPR Breathing Performance

Questions and Comments

Q: Goran Bernstrom, SEA. Does it makes sense to have a minimum time when we have indicators for both flow and battery?

A: We are still evaluating minimum times. The four hours comes from the industrial silica dust standard.

C: On the slide, you have peak “Volumes” of 115 Lpm and 300 Lpm. That should read peak “Rate”.

A: Yes that is correct.

Q: Is the high/moderate breathing performance directed to work rates or is it related to higher / lower protection.

A: It is to establish breathing performances. The protection will be the same.